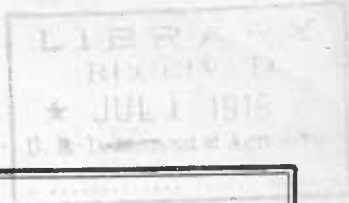


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HOME CANNING

by the

ONE-PERIOD COLD PACK METHOD

Taught to Canning Club
Members in the
Northern and
Western
States



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FARMERS' BULLETIN 839 *rev. May 1918*
UNITED STATES DEPARTMENT OF AGRICULTURE

Contribution from the States Relations Service
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Washington, D. C.

Issued June, 1917
reprint May, 1918

THERE ARE CERTAIN ESSENTIALS for the successful canning of fruits or vegetables. These include clean, fresh materials, perfect containers, including good rubber rings if used, heating for sufficient time to insure preservation, and air-tight sealing. These essentials must be secured in any method of canning. The details of procedure may differ, yet all have as their object the prevention of spoilage.

The material in this bulletin presents the practice generally followed in the Northern, Central, and Western States and taught in those States by the Extension representatives of the Department of Agriculture. A presentation of practices generally followed in the Southern States and taught in those States by Extension representatives of this Department is contained in another bulletin.

HOME CANNING BY THE ONE-PERIOD COLD-PACK¹ METHOD.

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HOW CANNING PRESERVES FOOD.

IF FOOD products are left in their natural state, most of them spoil in a few hours or a few days owing to the growth on their surface or in their tissues of bacteria, molds, or other organisms of decay. If such organisms usually present in food can be killed and the entrance of other organisms prevented, the food can be kept in good condition practically indefinitely. It is this destruction of organisms and protection of the food from contamination that is accomplished by canning—the preparation and treatment before packing and process of placing food products in air-tight containers and sterilizing them.

Most home-makers are familiar with some form of canning. Much of the canning practiced in homes, however, has been restricted to the putting up of fruits. The canning of vegetables and of meats has been considered until recently by all but a relatively few persons to be too complicated to be done satisfactorily in the home. By the method adopted for use in the home canning-club work of the United States Department of Agriculture in the Northern and Western States, however, it has been found to be a relatively simple matter to can practically any food product in the home with ordinary kitchen equipment and with the expenditure of comparatively little labor. This method of canning is described in the following pages and is intended primarily for use in the Northern and Western States. By its use the time required for the treatment of food to prepare it for keeping is reduced to a minimum.

¹ A few products, such as soup stock and food combinations, owing to their physical condition, are packed hot. The general principles involved, however, are the same in all other regards.

PREPARATIONS FOR CANNING.

The first steps in the canning method described in this bulletin, as in all canning, consist in the preparation and cleaning of containers and in the preparation of the products to be canned by washing, paring, trimming, and cutting into pieces where division is necessary.

Those engaged in the work should start with clean hands, clean utensils, clean, sound, fresh products, and pure, clean, soft water. No vegetables or fruits which are withered or unsound should be canned. If possible, only fruits and vegetables picked the day of canning should be used. Peas and corn, which lose their flavor rapidly, should be canned, in fact, within five hours if a choice product is desired.

Before the preparation of the products is begun the containers should be washed. If glass or crockery jars are used they should be placed in a vessel of cold water over a fire to heat. They will then be hot and ready for use when the products have been prepared for packing.

All grit and dirt should be washed carefully from the materials to be used. All products should be graded especially for ripeness. Large fruits and vegetables should be pared if necessary, and small fruits, berries, and greens picked over carefully.

STEPS IN CANNING.

After the materials have been cleaned and put into the shape in which they are to be canned, and containers have been cleaned and tested, the canning procedure for most products by the one-period cold-pack method consists of five steps—scalding or blanching

cold-dipping, packing, processing, and sealing. In canning berries and all soft fruits the blanching is dispensed with.



FIG. 1.—Packing the product to be canned in cheese-cloth for blanching.

The products to be canned are blanched or scalded, usually (fig. 1, by being placed in a cheese-cloth bag or dipping basket and dipped into boiling water and allowed to remain there from 1 to 15 minutes, depending on the kind of product (fig. 2). In the case of greens and

green vegetables, however, the scalding is accomplished most satisfactorily in steam, as volatile oils and other substances remain in the food under this treatment. Such products may be put into a colander, set over a vessel of boiling water and covered as tightly as possible. Better results may be obtained, however, by the use of a steam cooker.

As soon as the product is removed from the boiling water or steam it should be

dipped (fig. 3) into cold, clean water and immediately removed and drained for a few moments. The temperature of the water used for cold-dipping should be as low as possible.

The product should be packed carefully into hot jars (fig. 4) as soon as removed. In the case of fruits, boiling hot sirup or hot water is then added (fig. 5). In the case of vegetables, hot water usually is used and salt is added for seasoning. The scalded rubbers and tops of jars are put into place (fig. 6), the tops of cans sealed, and the containers are placed in a hot-water bath, pressure cooker, or other similar device for processing (fig. 7).

Processing is the final application of heat to sterilize the product and is continued for a period determined by the character of the product and the kind of apparatus used (see time schedule on pp. 29-31). The containers should be placed in the processing vessel as soon as they are filled.

Immediately after the termination of the processing period (fig. 8), while the products are still hot, glass and similar containers must be sealed (fig. 9).

Jars should then be placed in a tray upside down to cool and closely examined for leaks. If leakage occurs, the covers should be tightened until they are completely closed.

Tin cans may be cooled by plunging them in cold water. When the packed containers are thus cooled, they should be



FIG. 2.—Cheese-cloth-wrapped product being lowered into boiling water for blanching.



FIG. 3.—Dipping blanched product while hot into cold water.

stored in a cool, dry place not exposed to freezing temperature. Most products packed in glass jars will bleach or darken if exposed to light. It is well, therefore, to wrap jars in paper (fig.10). From time to time, especially during very hot weather, both glass jars and tin cans should be examined to make certain that there are no leaks, swellings, or other signs of fermentation.

EQUIPMENT REQUIRED.

Whatever type of apparatus is used for processing or sterilizing, a number of utensils are needed for properly handling the products during the preceding steps. These include five or six acid-proof pans with covers for use in handling and blanching acid fruits, two tablespoons, one set of measuring spoons, one wire basket or several yards of cheese-cloth for use in blanching, six wiping cloths, two hand towels, one duplex fork for lifting hot jars, several sharp paring knives, a generous supply of clean hot and cold water, a garbage pail for scraps, and a good stove or other heating device.

For processing, home canners may choose from among several types of apparatus, according to their needs and means. The outfits in common use are of five general types:

1. HOMEMADE OUTFITS.

Homemade outfits (fig. 11) are constructed of such utensils as wash boilers, tin pails, milk cans, metal washtubs, and lard pails. Such canners should have well-fitting covers and false bottoms or lifting platforms of metal or wood. The latter are to support jars or cans to prevent direct contact with heat and also to permit a free circulation of water and steam around and under the containers.

2. HOT-WATER-BATH COMMERCIAL OUTFITS.

Hot-water-bath commercial outfits (fig. 12) are constructed usually for outdoor work, and have a sterilizing vat, lifting trays, fire box,

and smoke pipe, combined in one piece. They are light and convenient, and are planned as portable outfits. The products should be sterilized in such outfits in completely sealed tin cans or partially sealed glass jars immersed in boiling water. The only advantage of these outfits over the homemade devices is that they are more convenient and have all the necessary equipment for operation. Both the homemade and hot-water commercial canners are classed as hot-water-bath outfits.

3. WATER-SEAL OUTFITS.

Water-seal outfits (fig. 13) consist of a double-walled bath (*A*) and cover (*B*) which projects down into the water between the outer and inner walls, thus making three tin or galvanized metal walls and two water jackets between the sterilizing vat and outer surface of the canner. A higher temperature may be maintained more uniformly with such an outfit than with the hot-water-bath outfits, since the free escape of steam is prevented and a slight steam pressure is maintained. The water-seal outfit may prove more economical of heat, especially in the canning of vegetables and meats, where high temperatures are necessary for complete sterilization.

4. STEAM-PRESSURE OUTFITS.

Steam-pressure outfits (fig. 14) are made to carry from 5 to 30 pounds of steam pressure, and are equipped with a steam-tight sterilizer, lifting crate, thermometer or pressure gauge, safety valve, and steam petcock. The pressure canner may be regulated easily so as



Fig. 4.—Packing blanched and cold-dipped product into jars. Note empty jars to be packed inverted in pan of hot water. They are thus kept clean and hot.



FIG. 5.—Filling jars with hot liquid after the product is packed.

to maintain different temperatures. It is thus adaptable for use in sterilizing various vegetables and food products.

5. ALUMINUM PRESSURE COOKERS.

Aluminum pressure cookers (fig. 15) are combination outfits for general cooking purposes which are used also for home canning of fruits, vegetables, and meats. They may be used for canning during the canning season and as cookers

during the entire year. As a type, these pressure cookers are light in construction and economical of heat. They are made entirely of aluminum and will carry as high as 30 pounds steam pressure. They are equipped with a steam-pressure gauge, safety valve, and petcock, as are steam-pressure outfits.

OPERATION OF HOT-WATER-BATH AND WATER-SEAL OUTFITS.

Difficulties in the operation of hot-water-bath canning outfits may be avoided if the following rules are observed:

(1) Support the jars on a perforated platform sufficiently to permit the circulation of water under and around the jars.

(2) Have the water cover the tops of the jars by at least 1 inch.

(3) Count time as soon as the water begins to boil vigorously.

(4) Remove the jars from the water and tighten the covers as soon as the time is up.

Liquid may be lost from the jars during the sterilizing period if the water in the canner does not cover the tops of the jars, if the covers to the jars are adjusted too loosely,

or if the platform in the bottom of the canner does not permit the water to circulate underneath. Towels, excelsior, newspapers, hay, and the like are unsatisfactory for use in the bottoms of hot-water-bath outfits. Use a slat or perforated platform.



FIG. 6.—Putting tops of jars in place, without sealing, before sterilization.

OPERATION OF STEAM-PRESSURE CANNERS.

To secure the best results in the operation of steam-pressure canners, the following precautions should be observed:

- (1) Place each jar in hot water or in the canner as soon as packed.
- (2) Have the water come to the platform, but not above it; add hot water occasionally to prevent its boiling dry.
- (3) Have the canner absolutely steam-tight.
- (4) When the canner has been filled, fasten the opposite clamps moderately tight; then tighten each pair of clamps fully.
- (5) Allow the petcock to remain open until live steam escapes from it.
- (6) Close the petcock completely.
- (7) Force the pressure to the required point before counting time.
- (8) Maintain a uniform pressure during the sterilizing period.
This may be done by turning down gas or oil flame or moving canner off the stove partially.
- (9) Allow the canner to cool until the steam gauge registers zero before opening the petcock.
- (10) Remove the jars from the canner and tighten the lids as soon as the canner is opened.

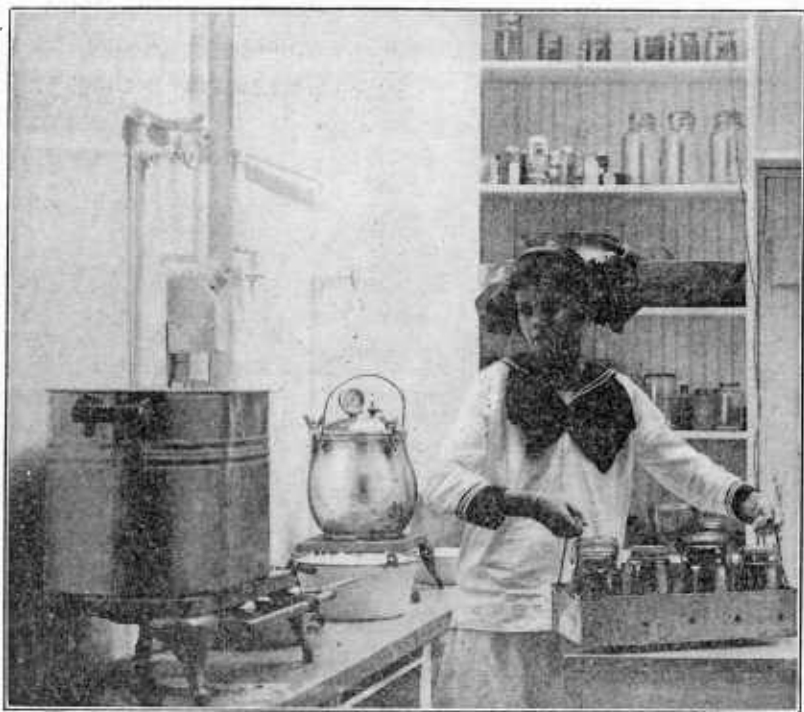


FIG. 7.—A tray of packed jars ready to be placed in a homemade water-bath outfit for sterilization. Aluminum pressure cooker is also shown.

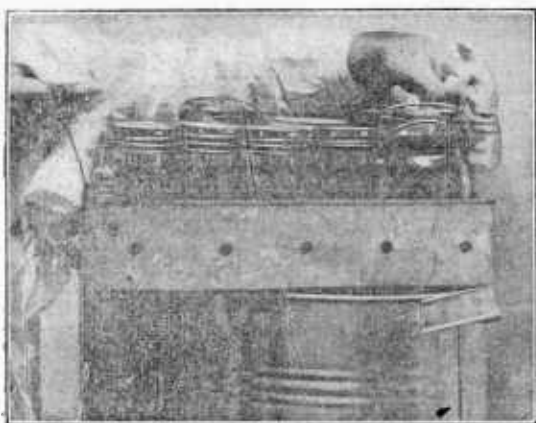


FIG. 8.—A tray of packed jars just after removal from sterilizing bath in a homemade water-bath outfit. The jars are now ready for sealing.

Liquid will be lost from jars during the sterilizing period if steam leaks at the joint and around the fittings; if the pressure is allowed to fluctuate, as by running up to 12 pounds, down to 7 pounds, and back to 10 pounds; if steam is allowed to blow from the petcock during or at the close of the sterilizing period; if a vacuum forms in the canner; or if the wire bails on

the glass-top jars are so loose that they will not go in with a snap.

CONTAINERS.

The method of canning here described does not require the use of a particular type of container. Glass jars, crockery jars (with air-tight tops) or tin cans of practically any type may be used if they are carefully cleaned and properly handled and sealed. When products are canned for use in the home, glass jars are perhaps preferable to tin cans. Jars may be sealed without the use of special apparatus and may be used over and over again if properly taken care of and if new rubbers are used each time. Tin cans, on the other hand, must be thrown away after being opened.

Tin cans, however, have certain advantages. They exclude light and so prevent bleaching, and they may be handled, packed, and transported more safely than glass jars. When products are canned for sale, tin cans are preferable except for local use in some sections and for fancy trade.



FIG. 9.—Sealing a packed and sterilized glass jar. Note that the wire lever has been pressed down.

The use of specific types of containers and the necessary steps to be taken in testing, preparing, sealing, cooling, and storing them are discussed in this bulletin on page 32.

NUMBER OF CANS OR JARS PER BUSHEL OF FRUIT OR VEGETABLES.

The following table shows the approximate number of cans or jars that can be filled per bushel of various fruits and vegetables:

Cans or jars per bushel of various fruits and vegetables.

Product (1 bushel).	No. 2 cans (pint jars).	No. 3 cans (quart jars).	Product (1 bushel).	No. 2 cans (pint jars).	No. 3 cans (quart jars).
Windfall apples.....	30	20	Tomatoes.....	22	15
Standard peaches.....	25	18	Shelled lima beans.....	50	30
Pears.....	45	30	String beans.....	30	20
Plums.....	45	30	Sweet corn.....	45	25
Blackberries.....	50	30	Shelled peas.....	16	10
Windfall oranges:			Sweet potatoes.....	30	20
Sliced.....	22	15			
Whole.....	35	22			

LEGAL RESTRICTIONS UPON THE SALE OF CANNED PRODUCTS.

If home-canned products are to be sold, certain legal restrictions

which are placed upon the sale of canned goods must be observed. If they are to be sold wholly within the State, information concerning the State food laws should be obtained by writing to the State food commissioners or the State board of health. If the products are to be shipped in interstate commerce, in-



FIG. 11.—Home canning-club member showing how she uses a common wash boiler for a canning outfit by simply providing a false bottom or blanching grate and cover cloth in order to make the cover tight and conserve heat.

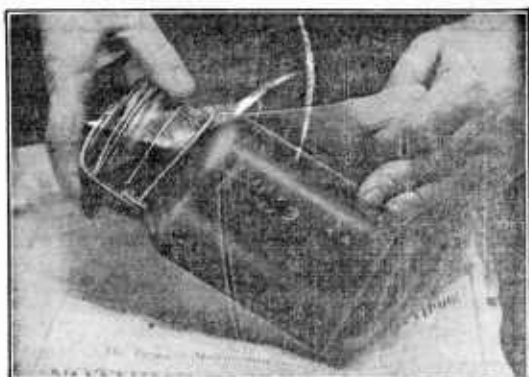


FIG. 10.—Wrapping sealed, sterilized pack before storing, to exclude light and so prevent the bleaching of the product.

formation should also be obtained concerning Federal laws and regulations by writing to the Bureau of Chemistry, United States Department of Agriculture, Washington, D. C. Products made and sold wholly within the District of Columbia or the Territories are also subject to the Federal Food and Drugs Act.

ALTITUDE CHANGES AND HOME CANNING.

The directions given in this bulletin for canning all kinds of vegetables, fruits, soups, meats, and combinations are based upon an altitude from sea level to 1,000 feet and upon the use of the quart jar or container. If using smaller jars, reduce the time a trifle; if using larger jars, increase the time.

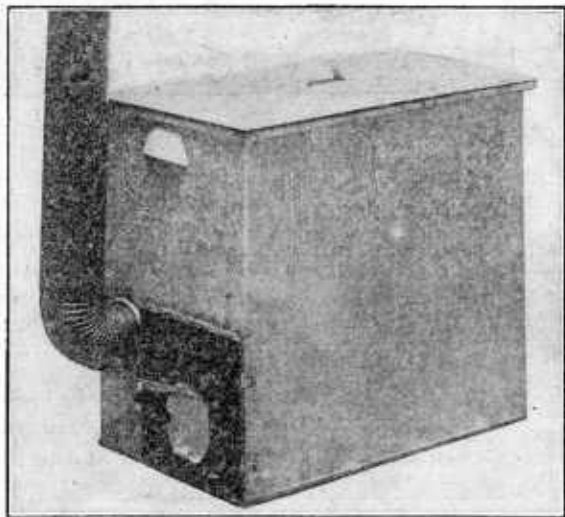


FIG. 12.—A hot-water-bath type of commercial canner, showing fire box, sterilizing vat, smoke pipe, and cover.

For altitudes above 1,000 feet the time of sterilization should be increased at the rate of 10 per cent for each 500 feet.

BRINES.

Brines of various strengths are used in canning some vegetables. The table following shows the proportion of salt and water required to make brines of given percentage strengths.

Table for making brines.

Strength of brine.		Salt necessary.		Water necessary.			Strength of brine.		Salt necessary.		Water necessary.			
<i>Per cent.</i>	<i>Pounds.</i>	<i>Gallons.</i>	<i>Quarts.</i>	<i>Pints.</i>	<i>Per cent.</i>	<i>Pounds.</i>	<i>Gallons.</i>	<i>Quarts.</i>	<i>Pints.</i>	<i>Per cent.</i>	<i>Pounds.</i>	<i>Gallons.</i>	<i>Quarts.</i>	<i>Pints.</i>
1	1	12	1	1	10	10	11	1	.....	12	12	11	.....	.....
2	2	12	1	.....	12	12	11	.....	.....	15	15	10	2	1
3	3	12	.....	1	15	15	10	2	1	18	18	10	1	.....
6	6	11	3	.....	18	18	9	1	.....	24	24	9	2	.....
8	8	11	2	.....	24	24	9	2	.....				

SEASONING.

In seasoning foods it should be kept in mind that most vegetables as well as meats are injured in flavor and quality by an excessive use of salt for seasoning in the canning process. A little salt is very palatable, and its use should be encouraged, but it is better to add no salt in canning than to use too much. Salt can be added to suit the taste when canned goods are served.

SIRUPS.

Sirups are employed usually in canning fruits. A formula much used in some sections for sirup is 3 quarts of sugar to 2 quarts of water, boiled to a thin, medium-thin, medium-thick, or thick sirup. The formula sometimes called the Eastern

formula is 3 quarts of water to 2 quarts of sugar, boiled to a thin, medium-thin, medium-thick, or thick sirup. The first formula may be used in canning all kinds of fruits delicate in flavor and texture and when sugar is low or reasonable in price. When sugar is high in price and the character of the fruit is such that less sugar is required, the Eastern formula may be used.

Sirups of the approximate densities desired may be made easily without regard to the table of sirup densities given on page 14 and without the use of an instrument for determining density if the following points are kept in mind:

Thin sirup is sugar and water boiled sufficiently to dissolve all of the sugar, but is not sticky. Such sirup has a density of from 12 to 20 per cent.

Medium-thin sirup is that which has begun to thicken and becomes sticky when cooled on the fingertip or spoon (density of from 20 to 40 per cent).

Medium-thick sirup is that which has thickened enough to roll or pile up over the edge of the spoon when it is poured out (density of from 40 to 50 per cent).

Thick sirup is that which has become so

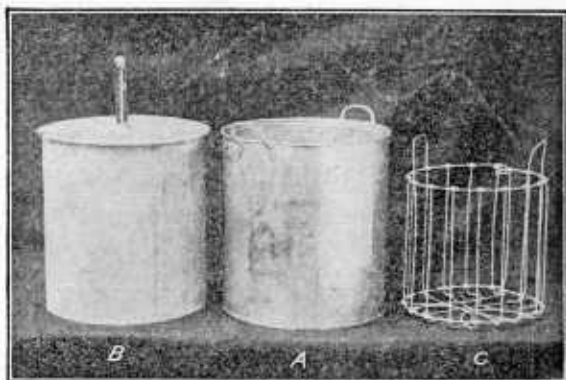


FIG. 13.—A type of water-seal canner: (A) Double-walled vat, (B) cover with thermometer, (C) crate for jars and cans.

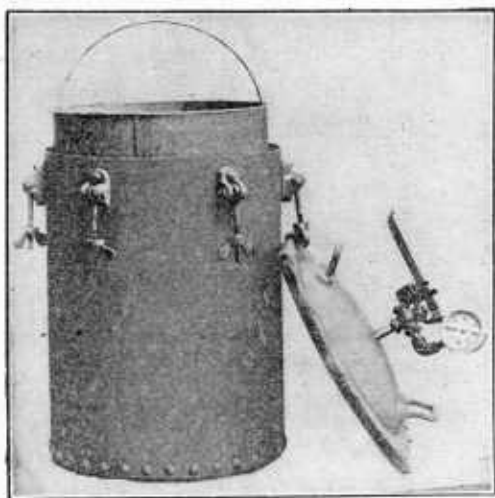


FIG. 14.—A type of cast-iron steam-pressure canner. Will carry 30 pounds of pressure.

thick that it is difficult to pour out of a spoon or container, but is not sugared (density from 50 to 64 per cent).

Thin sirups are used for all sweet fruits such as cherries, peaches, apples, etc., that are not too delicate in texture and color. Medium-thin sirups are used in the canning of the medium-sweet fruits, such



FIG. 15.—Aluminum pressure type of canner, used for both canning and cooking purposes. It is handled on the same basis as all pressure outfits and carries the same pressure values.

as blackberries, currants, dewberries, huckleberries, raspberries, etc. Medium-thick sirups are used in the canning of all sour fruits, such as gooseberries, apricots, sour apples, etc., and delicately colored fruits, such as strawberries and red raspberries. Thick sirup is used in preserving and making all kinds of sun-cooked preserves.

HOW TO DETERMINE SIRUP DENSITY.

Unsatisfactory results frequently follow the use of sirups which are not of the density best suited to the particular

purpose for which they are employed. The following table gives the proportions of sugar and water required to prepare sirup of the desired density. No allowance has been made for evaporation during heating:

Proportions of sugar and water in sirup of different density.

Desired sirup density.			Desired sirup density.		
<i>Per cent.</i>	<i>Pounds.</i>	<i>Quarts.</i>	<i>Per cent.</i>	<i>Pounds.</i>	<i>Quarts.</i>
12	1½	5½	35	7	6½
15	3	8½	40	2	1½
18	4½	10½	50	2	1
24	6	9½	60	6	2
28	7	9	64	16	4½

CANNING FRUIT WITHOUT SUGAR.

All fruits can be canned successfully for future use for jelly making, pie filling, salad purposes, etc., without the use of sugar by simply adding hot water instead of the hot sirups. It has been found practicable also with certain vegetables to substitute sugar for salt in the canning process, and then add other seasoning to taste when serving.

In canning fruit without sugar, can the product the day it is picked. Cull, stem, seed, and clean fruit by placing in strainer and pouring cold water over it. Pack the product carefully in hot glass jars or tin cans until full. Use a tablespoon, wooden ladle, or table knife for packing purposes. Pour boiling hot water over the product in the hot jar. Place rubbers and caps in position, not tight. If using tin cans, seal completely. Place in the sterilizer vat, or canner, and sterilize for the length of time given below according to the particular type of outfit used:

	Minutes.
Hot-water bath, homemade or commercial.....	30
Water seal, 214°.....	20
5 pounds steam pressure.....	12
10 pounds steam pressure.....	10

After sterilizing remove the filled containers. Seal jars; invert to cool and test the joints. Wrap in paper to prevent bleaching and store in a dry, cool place. If tin cans are used it will be found advantageous to plunge them into cold water immediately after sterilization to cool them quickly.

CANNING DIRECTIONS.**VEGETABLES.**

Tomatoes.—Scald $1\frac{1}{2}$ minutes or until skins loosen. Cold-dip. Remove stems and cores. Pack directly into cans or hot jars. Press down with tablespoon (add no water). Add level teaspoonful salt per quart. Put rubbers and caps of jars into position, not tight. Seal tin cans completely. Sterilize for the length of time given below for the particular type of outfit used:

	Minutes.
Water bath, homemade or commercial.....	22
Water seal, 214°.....	18
5 pounds steam pressure.....	15
10 pounds steam pressure.....	10

Sweet peppers.—Use sweet green peppers. Place the peppers in the oven and bake them until the skins separate from the meat. Remove the skins. Pack them solid in hot glass jars or tin cans. Add water. Add 1 level teaspoonful of salt per quart. Put the rubbers and caps of jars in position, not tight. Cap and tip tin cans. Sterilize for the length of time given below for the particular type of outfit used:

	Minutes.
Water bath, homemade or commercial.....	90
Water seal, 214°.....	75
5 pounds steam pressure.....	60
10 pounds steam pressure.....	40

Remove the jars; tighten the covers; invert the jars to cool and test the joints. Wrap the jars to prevent bleaching.

Pumpkin, squash, hominy, and sauerkraut.—Prepare and cut into convenient sections. Blanch 3 minutes. Cold-dip; pack closely in hot jars or cans. Fill with boiling water. Add level teaspoonful salt per quart. Put rubbers and caps of jars into position, not tight. Seal tin cans completely. Sterilize for the length of time given below for the particular type of outfit used:

	Minutes.
Water bath, homemade or commercial.....	120
Water seal, 214°.....	90
5 pounds steam pressure.....	60
10 pounds steam pressure.....	40

Sweet corn.—Remove husk and silk. Blanch 5 minutes on cob. Cold-dip; cut corn from cob and pack directly in hot jars or cans ($\frac{1}{4}$ inch of top). Fill with boiling water. Add level teaspoonful salt per quart. Put rubbers and caps of jars into position, not tight. Seal tin cans completely. Sterilize for the length of time given below for the particular type of outfit used:

	Minutes.
Water bath, homemade or commercial.....	180
Water seal, 214°.....	120
5 pounds steam pressure.....	90
10 to 15 pounds steam pressure.....	60

Corn seems to give home canners more trouble than do most products; but, with care and study, corn may be canned as easily as any other product grown in the garden. A little experience in selecting the ear and the ability to recognize corn that is just between the milk and the dough stage are important. Cut the corn from the cob with a sharp, thin-bladed knife, and pack it at once into sterilized jars. Best results can be obtained when one person cuts the corn from the cob and one person fills the containers. If it is necessary for one person to work alone, he should cut off sufficient corn to fill one jar, pour on boiling water, add salt, place the rubber and the cap in position, and put the jar into the canner or hot water at once. Corn expands a little in processing, and for this reason jars should not be filled quite full. Corn that has reached the dough stage before being packed will have a cheesy appearance after canning. Corn should never be allowed to remain in the cold-dip water, and large quantities should not be dipped at one time unless sufficient help is available to handle the product quickly. Water-logged or soaked corn indicates slow and inefficient packing.

When canning sweet corn on the cob, follow same directions but pack whole ears in jars instead of the cut-off corn.

Home canning of field corn.—This product is commonly known as Corn Club Breakfast Food, or 4-H Brand Food Product. The corn should be selected between the milk and the dough stage. Wide-mouthed glass jars or tin cans should be used for canning this product. Avoid packing container too full, as the product swells during the sterilization period. The corn should be canned the same day it is picked from the field, if possible. The yellow field corn makes a yellow, butterlike food product when ground and canned. Avoid mixing the white and the yellow or Bloody Butcher corn in the same batch of food product. Secure a good grade of food chopper for grating the corn. Small 10-cent hand graters can be used, but work with these is too slow and tedious.

Blanch the corn ears in boiling hot water or live steam for 10 minutes. Remove and dip quickly in cold water. Cut the corn from the cob with a sharp, thin-bladed knife. Feed the corn to the food chopper and grind to a pulp. Cook this product in a kettle, add one level teaspoonful of salt to each quart, and a little butter, and sweeten a trifle with sugar. Cook (stir while cooking) until the product has assumed a thickened or pastelike mass. Then pack this product immediately in tin cans or hot glass jars to one-fourth inch of the top. Seal jars by placing rubber and cap in position and seal tin cans completely. Place jars and cans in wash boiler or sterilizer and process for the length of time given below for the particular type of outfit used:

	Minutes.
Hot-water bath, homemade or commercial.....	180
Water seal, 214°.....	120
5 pounds steam pressure.....	60
10 or 15 pounds steam pressure.....	50

After this product has been sterilized and cooled and stored away, it will form a solid butterlike mass, which when removed whole from the jars or pack may be cut in convenient slices for toasting, frying, and baking purposes, and will make a delicious food product, palatable, economical, and nourishing.

Vegetables such as wax beans, stringless beans, okra, green peppers, cabbage and Brussels sprouts.—String or hull. Blanch in live steam for 5 to 10 minutes. Remove and dip quickly in cold water. Pack in hot jars or tin cans and add boiling hot water until jars or tin cans are full. Add one level teaspoonful of salt to each quart. Put rubbers and caps of jars in position, not tight. Seal tin cans completely. Sterilize for the length of time given below for the particular type of outfit used:

	Minutes.
Water-bath, homemade or commercial.....	120
Water seal, 214°.....	90
5 pounds steam pressure.....	60
10 pounds steam pressure.....	40

Lima beans, peas, and other vegetables or combinations of them.—Blanch in live steam for 5 to 10 minutes. Dip quickly in cold water. Pack immediately in hot glass jars or tin cans. Add boiling hot water to fill container. Add level teaspoonful salt per quart. Place rubbers and caps of jars in position, not tight. Seal tin cans completely. Sterilize for the length of time given below for the particular type of outfit used:

	Minutes.
Water bath, homemade or commercial.....	180
Water seal, 214°.....	120
5 pounds steam pressure.....	60
10 to 15 pounds steam pressure.....	40

Remove from container; tighten cover; invert to cool, and test the joints. Wrap in paper to prevent breakage, and store.

Peas.—A cloudy or hazy appearance of the liquid when peas are keeping well indicates that the product was roughly handled in blanching and cold-dipping, or that split or broken peas were not removed before packing. When peas are too old and blanching is not done carefully, the skin becomes cracked and the liquid cloudy. Some waters of high mineral content have a tendency to increase cloudiness, also to harden the peas.

Cauliflower.—Use the flowered portion. Plunge it into cold brine (one-half pound salt to 12 quarts of water). Allow the cauliflower to remain in this brine for one hour. Blanch it 3 minutes and dip quickly into cold water. Pack it in hot glass jars or tin cans. Fill with boiling water and add a level teaspoonful of salt per quart. Put rubbers and caps of jars in position, not tight. Cap and tip cans. Sterilize for the length of time given below for the particular type of outfit used:

	Minutes.
Water bath, homemade or commercial.....	60
Water seal, 214°.....	40
5 pounds steam pressure.....	30
15 pounds steam pressure.....	20

Remove the jars; tighten covers; invert jars to cool, and test the joint. Wrap the jars with paper to prevent bleaching.

Mushrooms.—*Caution: Unless you are absolutely sure that you know a mushroom when you see it, do not run the risk of gathering and using for food what you think are mushrooms. A large number of persons are poisoned every year because of carelessness in this regard. Many very poisonous plants closely resemble edible mushrooms. Can mushrooms immediately after picking; if allowed to stand they become unfit for use. (See Farmers' Bulletin 796, Some Common Edible and Poisonous Mushrooms.)*

* Wash and trim the mushrooms. If small, can them whole; if large, they may be cut into sections. Blanch the mushrooms in boiling water 5 minutes. Remove and plunge them quickly into very cold water. Pack in hot glass jars and add boiling water to cover; add one level teaspoonful of salt to the quart. Place rubbers and caps of jars in position, not tight. Sterilize for the length of time given below for the particular type of outfit used:

	Minutes.
Water bath, homemade or commercial.....	90
Water seal, 214°.....	80
5 pounds steam pressure.....	50
15 pounds steam pressure.....	30

Remove the jars; tighten covers; invert jars to cool, and test the joints. Wrap jars in paper. If canning in tin, always use lacquered cans. Do not fail to blanch and cold-dip mushrooms before packing. After opening containers, remove the mushrooms immediately and use them as quickly as possible.

Root and tuber vegetables, such as carrots, parsnips, salsify, beets, turnips, and sweet potatoes.—Grade for size, color, and degree of ripeness. Wash thoroughly, use vegetable brush. Scald or blanch in hot water sufficiently to loosen the skin. Dip quickly into cold water. Scrape or pare to remove skin. Pack whole vegetables, slices, or cross-section pieces in hot glass jars or tin cans. Add boiling hot water until full. Add level teaspoonful salt to quart. Place rubbers and tops of jars in position; partially seal, but not tight. Cap and tip tin cans completely. Sterilize for the length of time given below for the particular type of outfit used:

	Minutes.
Water bath, homemade or commercial.....	90
Water seal, 214°.....	80
5 pounds steam pressure.....	60
10 pounds steam pressure.....	40

Remove jars from canner; tighten covers; invert to cool, and test joints. Wrap in paper and store.

How to prevent the fading of beets.—Small beets that run 40 to the quart are the most suitable size for first-class packs. The older the beet the more chance there is for loss of color. When preparing the beet, leave on 1 inch of the stem and all of the tail while blanching. Blanch not more than 5 minutes, and cold-dip. The skin should be scraped from the beet, not peeled. Beets should be packed whole, if possible. Well-canned beets will show a slight loss of color when removed from the canner, but will brighten up in a few days.

Greens or potherbs.—A large number of cultivated and wild greens are edible, and if canned by this method will make a succulent and valuable food for the winter and spring months. Among the cultivated greens are Swiss chard, kale, Chinese cabbage leaves, upland cress, French endive, cabbage sprouts, turnip tops, young tender New Zealand spinach, beet tops, dandelion, young tender dasheen sprouts, native mustard, Russian mustard, collards, and tender rape leaves. Among the wild greens are pepper cress, lamb's quarter, sour dock, smartweed sprouts, purslane, or "pulsey," poked-weed sprouts, dandelion, marsh marigold, wild mustard, and milkweed (tender sprouts and young leaves).

Can greens the day they are picked. Wash clean, sort thoroughly, allowing no foreign weed leaves or other vegetable matter to remain. Rid the greens of all sand, dirt, dry, and decayed or diseased leaves. Place the greens in a crate or cheese-cloth

and blanch in live steam either in an improvised homemade steamer or regular commercial steamer for 15 minutes. Remove the greens and plunge quickly into cold water. Place on the table and cut into convenient lengths. Pack tight in hot jars or tin cans. Add hot water to fill the container and season to taste. The product will be slightly improved if a few strips of boiled bacon or chipped beef are added. A little olive oil also improves the flavor. If using glass jars, place rubbers and tops in position; partially seal. If using tin cans, cap and tip completely. Sterilize for the length of time given below for the particular type of outfit used:

	Minutes.
Water bath, homemade or commercial.....	120
Water seal, 214°.....	90
5 pounds steam pressure.....	60
10 pounds steam pressure.....	40

Remove from canner; tighten covers of jars; invert to cool, and test the joints. Wrap in paper to prevent bleaching, and store.

VEGETABLE COMBINATIONS.

Corn and tomato combination.—Blanch fresh corn on the cob 5 minutes. Cold-dip quickly. Cut the corn from the cob, cutting from tip to butt. Scald the tomatoes $1\frac{1}{2}$ minutes and cold-dip. Remove the skin and core. Chop tomatoes into medium-sized pieces. Mix thoroughly 2 parts of tomatoes with 1 part of corn. Pack the mixture in hot glass jars or enameled tin cans. Add a level teaspoonful of salt per quart. Put rubbers and caps of jars in position, not tight. Cap and tip tin cans. Sterilize for the length of time given below for the particular type of outfit used:

	Minutes.
Water bath, homemade or commercial.....	120
Water seal, 214°.....	120
5 pounds steam pressure.....	60
15 pounds steam pressure.....	45

Remove the jars; tighten the covers; invert the jars to cool, and test the joints. Wrap the jars with paper to prevent bleaching.

Corn, tomato, and string-bean combination.—Use 1 part of corn, 1 part of green string beans, and 3 parts of tomatoes. Blanch fresh corn on the cob for 5 minutes and cold-dip. Cut the corn from the cob, cutting from tip to butt. Prepare string beans and cut them into convenient lengths. Blanch them 4 minutes and cold-dip. Blanch the tomatoes 1 to 3 minutes and cold-dip. Remove the skin and core. Cut the tomatoes into medium-sized pieces. Mix thoroughly. Pack the mixture in hot glass jars or enameled tin cans. Put rubbers and caps of jars in position, not tight. Cap and tip tin cans. Sterilize for the length of time given below for the particular type of outfit used:

	Minutes.
Water bath, homemade or commercial.....	120
Water seal, 214°.....	120
5 pounds steam pressure.....	60
15 pounds steam pressure.....	45

Remove the jars; tighten the covers; invert the jars to cool, and test the joints. Wrap the jars with paper to prevent bleaching.

FRUITS.

Soft fruits and berries.—These include apricots, blackberries, blueberries, cherries, currants, dewberries, figs, gooseberries, grapes, huckleberries, peaches, plums, raspberries, and strawberries.

After hulling, seeding, stemming, or skimming the fruit, place fruit in a strainer and rinse by pouring cold water over it. Pack from strainer into hot jars or cans without crushing, using big spoon or ladle. Hot sirup previously prepared should be poured

over the fruit at once. Before packing a second jar, place rubbers and caps in position, not tight. If using tin cans, seal completely. Enameled tin cans should be used for all highly acid berries. Sterilize for the length of time given below for the particular type of outfit used:

	Minutes.
Water bath, homemade or commercial.....	16
Water seal, 214°.....	12
5 pounds steam pressure.....	10
10 pounds steam pressure.....	5

Remove from canner; tighten covers; invert to cool, and test joints. Wrap in paper to prevent bleaching, and store.

Another recipe for strawberries.—Canned by this recipe, strawberries will not rise to the top of the sirup. Use only fresh, ripe, firm, and sound berries. Prepare them and add 8 ounces of sugar and 2 tablespoonfuls of water to each quart of berries. Boil slowly for 15 minutes in an enameled or acid-proof kettle. Allow the berries to cool and remain several hours or overnight in the covered kettle. Pack the cold berries in hot glass jars or enameled tin cans. Put the rubbers and caps of jars in position, not tight. Cap and tip tin cans. Sterilize for the length of time given below for the particular type of outfit used:

	Minutes.
Water bath, homemade or commercial.....	8
Water seal, 214°.....	6
5 pounds steam pressure.....	5
10 pounds steam pressure. (Do not use.)	

Remove the jars; tighten the covers; invert the jars to cool, and test the joints. Wrap the jars with paper to prevent bleaching.

Hard fruits: Apples, pears, and quinces.—Remove skin and core. Cut into convenient slices or sections and drop into slightly salted cold water, to keep from tarnishing. Blanch 1½ minutes. Cold-dip. Pack closely in hot jars or tin cans. Fill with hot sirup. Put rubbers and caps of jars into position, not tight. Seal tin cans completely. Sterilize for the length of time given below for the particular type of outfit used:

	Minutes.
Water bath, homemade or commercial.....	20
Water seal, 214°.....	12
5 pounds steam pressure.....	8
10 to 15 pounds steam pressure.....	6

Remove from canner; tighten covers; invert to cool, and test joints. Wrap in paper to prevent bleaching, and store.

Windfall apples.—Separate apples into two grades: Whole and reasonably sound and firm, first grade; all other apples (bruised, worm-eaten, and those containing decayed spots), second grade.

Whole apples, first grade.—Pare and core. Drop whole apples in cold, slightly salted water, to keep from tarnishing. Pack whole apples in gallon tin cans or 2-quart hot glass jars. Add thin hot sirup until full. Place rubbers and tops of jars in position, not tight. Seal tin cans completely. Sterilize for the length of time given below for the particular type of outfit used:

	Minutes.
Water bath, homemade or commercial.....	16
Water seal, 214°.....	10
5 pounds steam pressure.....	8
10 pounds steam pressure.....	5

Remove from canner; tighten covers; invert to cool, and test the joints. Wrap in paper to prevent bleaching, and store.

Apple-pie filling.—The only difference between the canning of apples for pie filling and canning them whole as by the directions above is that the apples should be sliced

immediately after paring into cold, slightly salted water. It will be found desirable to can first-grade apples either whole or quartered and second-grade apples sliced for use for pie filling. Second-grade apples and products prepared from poor stock should not be sold, of course, without labels which make the grade plain.

FRUIT JUICES.

The fruit juice may be pressed out of fruit by means of a cider press, special fruit press, or other improvised presses; then heated in an acid-proof kettle up to 110° F. The fruit juice may then be poured into ordinary hot jars, hot bottles, or tin cans, and handled by the same directions as those for canning of fruit itself. If poured into miscellaneous bottles, it is suggested that the fruit juice be sterilized as follows:

Make a cotton stopper and press into the neck of the bottle and leave during the sterilization period. Set bottles in boiling hot water up to the neck of the bottle, sterilize the fruit juice for 40 minutes at a temperature of 165° F. Remove the product, press cork in top over cotton stopper immediately. If the cork fits well, no paraffin need be used. If a poor cork, it may be necessary to dip the cork in a melted solution of wax or paraffin. Fruit juices and apple cider when handled in this way will not "flatten in taste" and will keep fresh for future use.

SIRUP MADE FROM WINDFALL APPLES AND APPLE CIDER.¹

Add 5 ounces of powdered calcium carbonate to 7 gallons of apple cider. Powdered calcium carbonate (carbonate of lime) or, to give it its common name, precipitated chalk, is low-priced and harmless. Boil the mixture in a kettle or vat vigorously for five minutes. Pour the liquid into vessels, preferably glass jars or pitchers; allow to stand six or eight hours, or until perfectly clear. Pour the clear liquid into a preserving kettle. Do not allow sediment at bottom to enter. Add to the clear liquid one level teaspoonful of lime carbonate and stir thoroughly. The process is completed by boiling down rapidly to a clear liquid. Use density gauge or candy thermometer and bring the temperature up to 220° F. If a thermometer is not available, boil until bulk is reduced to one-seventh of the original volume. To determine whether the sirup is cooked enough test as for candy—by pouring a little into cold water. If boiled enough it should have the consistency of maple sirup. It should not be cooked long enough to harden like candy when tested.

When the test shows that the sirup has been cooked enough, pour it into fruit jars, pitchers, etc., and allow it to cool slowly. Slow cooling is important, as otherwise the suspended matter will not settle properly and the sirup will be cloudy.

A good way to insure slow cooling is to stand the vessels, full of sirup, in a bucket or a wash boiler of hot water or to place them in a fireless cooker. The white sediment which settles out during cooking is called "malate of lime" and is a harmless compound of lime with the natural acid of the apple. When the sirup is cooled, it should be stored in fruit jars, bottles, or jugs and crocks. Place the rubber and cap or cotton stopper or cork in position and tighten. Place the container in boiling hot water and sterilize for the length of time given below for the particular type of outfit used:

	Minutes.
Water bath, homemade or commercial.....	15
Water seal, 214°.....	10
5 pounds steam pressure.....	8
10 pounds steam pressure.....	5

Remove jars and tighten covers. Invert to cool, and test the joints. Store for future use. This recipe is for making sirup primarily for home consumption. If the product is to be sold, legal requirements as to labeling should be ascertained and complied with.

¹ Apple-sirup directions furnished by H. C. Gore, Bureau of Chemistry.

PRESERVES.

The one-period cold-pack method of canning will be found especially helpful in eliminating the necessity of using paraffin or other wax tops for jellies, jams, and preserves. Three recipes and directions for canning jellies, jams, and preserves by this method follow to illustrate the application of the method. The use of containers with screw tops is recommended for these products. This will make unnecessary the expense and trouble of using paraffin, and will make the melting, molding, and deterioration of the top parts of the packs less likely.

Strawberry.—Make a sirup of 1 quart of water and 11 pounds of sugar and cook it in an open kettle until the usual temperature for making candies, jellies, etc., is reached. If a candy thermometer is used, cook the preserves until they reach a temperature of 265° F. A candy thermometer registers 265° F. when placed in the sirup. Add 8 pounds of berries to the sirup. Cook very slowly, just at the boiling point. Stop the cooking when the thermometer registers 219° F. and pour into shallow pans to cool. Hasten the cooling by pouring sirup over the berries. Skim while cooking. Fill into hot jars. Put the rubber and cap in position, not tight. Cap and tin if using enameled tin cans. Sterilize for the length of time given below for the particular type of outfit used:

	Minutes.
Water bath, homemade or commercial.....	20
Water seal, 214°	15
Steam pressure (see note under cherry preserves).....	10

Remove the jars; tighten the covers; invert the jars to cool, and test the joint. Wrap the jars in paper to prevent bleaching.

Cherry.—Place 1 gallon of cold water in a kettle and add 10 pounds of pitted cherries. After bringing to boiling point continue to boil slowly for 18 minutes. Add 12 pounds of granulated sugar and cook until after the mixture has boiled violently for a few minutes. If a candy thermometer is used, cook the mixture until a temperature of 219° F. is reached. Pack into hot glass jars. Put the rubber and cap in position, not tight. Cap and tip if using enameled tin cans. Sterilize for the length of time given below for the particular type of outfit used:

	Minutes.
Water bath, homemade or commercial.....	20
Water seal, 214°	15
Steam pressure	10

When using pressure-cooker outfits on preserves, keep the valve open during the period of sterilization.

SUN PRESERVES.

Strawberry.—Select ripe, firm berries. Pick and preserve them the same day. Hull and rinse as in No. 1, p. 19. Place them in a shallow platter in a single layer; sprinkle sugar over them; pour over them 50° sirup (same as strawberry preserves, but boiled thicker). Cover them with a glass dish or a plain window glass. Allow them to stand in the hot sun 8 or 12 hours. Pack them in hot screw-top jelly glasses. Put the rubber and cap in position, not tight. Cap and tip if using enameled tin cans. Sterilize for the length of time given below for the particular type of outfit used:

	Minutes.
Water bath, homemade or commercial.....	20
Water seal, 214°	15
Steam pressure (see note under cherry preserves).....	10

Remove the jars; tighten the covers; invert the jars to cool, and test the joint. Wrap the jars in paper to prevent bleaching.

SOUPS.

Soup stock.—Strip off the fat and meat from 25 pounds of beef hocks, joints, and bones containing marrow. Crack bones with a hatchet or cleaver. Reserve meat

and fat for other use. Put the broken bones into a thin cloth sack and place in a large kettle containing 5 gallons of cold water. Simmer (do not boil) for 6 or 7 hours. Do not salt while simmering. Skim off all fat. This should make about 5 gallons of stock.

List of supplies needed.

25 pounds of beef bones. | 5 gallons of water.

Pack hot into hot glass jars, bottles, or enameled or lacquered tin cans. Partially seal glass jars. Cap and tip tin cans. Sterilize for the length of time given below for the particular type of outfit used:

	Minutes.
Water bath, homemade or commercial.....	90
Water seal, 214°.....	75
5 pounds steam pressure.....	60
10 to 15 pounds steam pressure.....	45

Vegetable soup.—Soak one-fourth pound lima beans and 1 pound rice for 12 hours. Boil one-half pound pearl barley for 2 hours. Blanch 1 pound carrots, 1 pound onions, 1 medium-sized potato, and 1 red pepper for 3 minutes, and cold-dip. Prepare the vegetables and cut into small cubes. Mix thoroughly lima beans, rice, barley, carrots, onions, potatoes, and red pepper. Fill hot glass jars or enameled tin cans three-fourths full of the above mixture of vegetables and cereals. Make a smooth paste of one-half pound of wheat flour and blend in 5 gallons of soup stock. Boil 3 minutes and add 4 ounces salt.

List of supplies needed.

¼ pound lima beans.	1 medium-sized potato.
1 pound rice.	1 red pepper.
½ pound pearl barley.	½ pound flour.
1 pound carrots.	4 ounces salt.
1 pound onions.	5 gallons soup stock.

Pour stock over vegetables and fill cans or hot glass jars. Partially seal glass jars. Cap and tip tin cans. Sterilize for the length of time given below for the particular type of outfit used:

	Minutes.
Water bath, homemade or commercial.....	90
Water seal, 214°.....	75
5 pounds steam pressure.....	60
10 to 15 pounds steam pressure.....	45

Cream of pea soup.—Soak 8 pounds of dry peas overnight. Cook until soft. Mash fine. Add the mashed peas to 5½ gallons of soup stock and bring to boil. Pass the boiling liquid through a fine sieve. Make a smooth paste of one-half pound flour and add paste, 10 ounces of sugar, and 3 ounces of salt to the soup stock. Cook until soup begins to thicken.

List of supplies needed.

5½ gallons soup stock.	10 ounces granulated sugar.
8 pounds dry peas.	½ pound flour.
3 ounces salt.	

Pack in hot glass jars or tin cans. Partially seal glass jars. Can and tip tin cans. Sterilize for the length of time given below for the particular type of outfit used:

	Minutes.
Water bath, homemade or commercial.....	90
Water seal, 214°.....	75
5 pounds steam pressure.....	60
10 to 15 pounds steam pressure.....	45

Cream of potato soup.—Boil $1\frac{1}{2}$ pounds of potatoes, sliced thin, and 5 gallons of soup stock for 10 minutes. Add 3 ounces of salt, one-fourth teaspoonful of pepper, and one-half pound of butter, and boil slowly for 5 minutes. Make 3 tablespoonfuls of flour into smooth paste and add to the above.

List of supplies needed.

5 gallons soup stock.	$\frac{1}{4}$ tablespoonful pepper (scant).
$1\frac{1}{2}$ pounds thin-sliced potatoes (culls will do).	$\frac{1}{2}$ pound butter.
3 ounces salt.	3 tablespoonfuls flour.

Cook 3 minutes and pack in hot glass jars or tin cans while hot. Partially seal glass jars. Cap and tip tin cans. Sterilize for the length of time given below for the particular type of outfit used:

	Minutes.
Water bath, homemade or commercial.....	90
Water seal, 214°	75
5 pounds steam pressure.....	60
10 to 15 pounds steam pressure.....	45

Bean soup.—Soak 3 pounds of beans 12 hours in cold water. Cut 2 pounds of ham meat into one-fourth-inch cubes and place in a small sack. Place the beans, ham, and 4 gallons of water in a kettle and boil slowly until the beans are very soft. Remove the ham and beans from the liquor and mash the beans fine. Return the ham and mashed beans to the liquor and add 5 gallons of soup stock and seasoning and bring to boil.

List of supplies needed.

5 gallons stock.	4 gallons water.
3 pounds beans.	Salt and pepper to taste.
2 pounds lean ham.	

Pack into hot glass jars or tin cans while hot. Partially seal glass jars. Cap and tip tin cans. Sterilize for the length of time given below for the particular type of outfit used:

	Minutes.
Water bath, homemade or commercial.....	90
Water seal, 214°	75
5 pounds steam pressure.....	60
10 to 15 pounds steam pressure.....	45

Okra soup.—Slice 8 pounds okra into thin disks. Blanch 10 minutes and cold-dip. Boil $1\frac{1}{2}$ pounds rice for 25 minutes. Mix the okra and rice and fill the cans or hot jars half full. To 5 gallons soup stock add 5 ounces salt, one-fourth teaspoonful of coriander seed, and one-fourth teaspoonful of powdered cloves, and bring to a boil.

List of supplies needed.

5 gallons soup stock (see No. 1).	$\frac{1}{4}$ teaspoonful powdered cloves.
8 pounds okra.	$1\frac{1}{2}$ pounds rice.
$\frac{1}{4}$ teaspoonful coriander seed.	5 ounces salt.

Fill the remaining portion of the jars or cans with the seasoned food. Partially seal the glass jars. Cap and tip tin cans. Sterilize for the length of time given below for the particular type of outfit used:

	Minutes.
Water bath, homemade or commercial.....	90
Water seal, 214°	75
5 pounds steam pressure.....	60
10 to 15 pounds steam pressure.....	45

Tomato pulp for cream of tomato soup.—Place tomatoes in a wire basket or piece of cheese-cloth and plunge into boiling water from 1 to 3 minutes. Plunge into cold water. Remove the skin and core. Place tomatoes in a kettle and boil 30 minutes. Pass the tomato pulp through a sieve. Pack in hot glass jars and tin cans while hot, and add a level teaspoonful of salt per quart. Partially seal glass jars. Cap and tip tin cans. Sterilize for the length of time given below for the particular type of outfit used:

	Minutes.
Water bath, homemade or commercial.....	30
Water seal, 214°.....	20
5 pounds steam pressure.....	18
10 to 15 pounds steam pressure.....	10

Chicken=soup stock.—Place 30 pounds chicken in 10 gallons of cold water and simmer over fire for 5 hours. Remove meat from bones, then strain. Add sufficient water to make 10 gallons of stock.

List of supplies needed.

30 pounds chicken. | 10 gallons water.

Fill hot glass jars or enameled tin cans with the hot stock. Partially seal glass jars. Cap and tip tin cans. Sterilize for the length of time given below for the particular type of outfit used:

	Minutes.
Water bath, homemade or commercial.....	90
Water seal, 214°.....	75
5 pounds steam pressure.....	60
10 to 15 pounds steam pressure.....	45

Chicken broth with rice.—For each gallon of soup stock use 12 ounces of rice. Boil the rice 30 minutes. Fill hot jars or enameled tin cans two-thirds full of rice and the remainder with soup stock. Partially seal glass jars. Cap and tip tin cans. Sterilize for the length of time given below for the particular type of outfit used:

	Minutes.
Water bath, homemade or commercial.....	90
Water seal, 214°.....	75
5 pounds steam pressure.....	60
10 to 15 pounds steam pressure.....	45

Chicken gumbo.—Cut 2 pounds of ham into small cubes and boil 30 minutes. Mince 3 pounds chicken and chop $\frac{1}{2}$ pound of onions fine. Make a smooth paste of $\frac{1}{2}$ pound of flour. Add above to 5 gallons of chicken-soup stock. Then add $\frac{1}{2}$ pound of butter and $\frac{1}{4}$ pound of salt and boil 10 minutes; then add 3 ounces of powdered okra mixed with 1 pint of water.

List of supplies needed.

5 gallons chicken-soup stock.	$\frac{1}{2}$ pound butter.
3 pounds minced chicken.	$\frac{1}{4}$ pound salt.
2 pounds ham.	$\frac{1}{2}$ pound flour.
$\frac{1}{2}$ pound onions.	3 ounces powdered okra.

Fill into hot glass jars or enameled tin cans while hot. Partially seal glass jars. Cap and tip tin cans. Sterilize for the length of time given below for the particular type of outfit used:

	Minutes.
Water bath, homemade or commercial.....	90
Water seal, 214°.....	75
5 pounds steam pressure.....	60
10 to 15 pounds steam pressure.....	45

VEGETABLES FOR SOUP.

If it is impracticable to obtain materials for making soup stock in the summer when vegetables are abundantly available, the vegetable portion of the soup may be canned alone. The preparation of soup from cans of such vegetable combinations will be a relatively simple matter whenever stock is available, as it should be in most households if meat refuse is properly utilized.

Soak 6 pounds of lima beans and 4 pounds of dry peas overnight. Boil each one-half hour. Blanch 16 pounds of carrots, 6 pounds of cabbage, 3 pounds of celery, 6 pounds of turnips, 4 pounds of okra, 1 pound of onions, and 4 pounds of parsley for 3 minutes, and dip all in cold water quickly. Prepare the vegetables and chop them into small cubes. Chop the onions and celery extra fine. Mix all of the vegetables together thoroughly and season to taste.

List of supplies needed.

16 pounds carrots (small).	4 pounds okra.
6 pounds cabbage.	1 pound onions.
3 pounds celery (stems and leaves).	4 pounds parsley.
6 pounds turnips.	4 pounds dry peas.
6 pounds lima beans.	Salt and pepper to taste.

Pack in hot glass jars or tin cans. Fill with boiling water. Partially seal glass jars. Cap and tip tin cans. Sterilize for the length of time given below for the particular type of outfit used:

	Minutes.
Water bath, homemade or commercial.....	90
Water seal, 214°.....	75
5 pounds steam pressure.....	60
10 to 15 pounds steam pressure.....	45

MEATS.

While meats may be canned successfully if directions are followed carefully, it is perhaps advisable for beginners in canning to start with vegetables and fruits, taking up the canning of meats only after thorough familiarity with the process described in this bulletin has been acquired. If canned meat products are to be offered for sale through interstate shipment, inquiry should be made of the United States Department of Agriculture and State food-regulating agencies in regard to the steps which must be taken to comply with the United States meat-inspection regulations and local laws.

Poultry and game birds.—*Recipe No. 1.* Kill fowl and draw at once; wash carefully and cool; cut into convenient sections. Place in wire basket or cheese-cloth and boil until meat can be removed from bones; remove from boiling liquid and remove meat from bones; pack closely into glass jars or enameled cans; fill jars with pot liquid after it has been concentrated one-half; add level teaspoonful of salt per quart of meat for seasoning; put rubbers and caps of jars into position, not tight. Cap and tip tin cans. Sterilize for the length of time given below for the particular type of outfit used:

	Hours.
Water bath, homemade or commercial.....	3
Water seal, 214°.....	3
5 pounds steam pressure.....	2
10 to 15 pounds steam pressure.....	1

Remove jars; tighten covers; invert to cool, and test joints. Wrap jars with paper.

Recipe No. 2. Kill fowl and draw at once; wash carefully and cool; cut into convenient sections; scald in boiling water and dip at once into cold water. Pack immediately into glass jars or enameled cans; fill with boiling water; add level teaspoonful of salt per quart; put rubbers and caps of jars into position, not tight. Cap and tip tin cans. Sterilize for the length of time given below for the particular type of outfit used:

	Hours.
Water bath, homemade or commercial.....	3
Water seal, 214°	3
5 pounds steam pressure.....	2
10 to 15 pounds steam pressure.....	1

Remove jars; tighten covers; invert to cool, and test joints. Wrap jars with paper to prevent bleaching.

Fresh beef.—Obtain fresh beef, cut into convenient pieces for handling (about $\frac{3}{4}$ pound in weight), and roast or boil slowly for one-half hour. Cut into small pieces, remove gristle, bone, and excessive fat, and pack directly into hot glass jars; fill with gravy from the roasting pan or pot liquid concentrated to one-half its volume; put rubber and cap into position, not tight. Sterilize for the length of time given below for the particular type of outfit used:

	Hours.
Water bath, homemade or commercial.....	3
Water seal, 214°	3
5 pounds steam pressure.....	2
10 to 15 pounds steam pressure.....	1

Corned beef.—After beef has been properly corned for the required time, remove it from the brine; soak for two hours in clear water, changing the water once; place in a wire basket and boil slowly for one-half hour; remove from the boiling water, plunge into cold water, and remove gristle, bone, and excessive fat. Cut meat into small pieces and pack closely into hot glass jars or enameled cans. Put rubbers and caps of jars into position, not tight. Cap and tip tin cans. Sterilize for the length of time given below for the particular type of outfit used:

	Hours.
Water bath, homemade or commercial.....	3
Water seal, 214°	3
5 pounds steam pressure.....	2
10 to 15 pounds steam pressure.....	1

SPECIALLY PREPARED MEATS.

Spring chicken, fried.—After cleaning and preparing spring frys, season and fry as though preparing for serving directly on the table. Cook until the meat is about three-fourths done. If a whole spring chicken, break the neck and both legs and fold around body of chicken. Roll up tight, tie a string around the chicken, and drop this hot, partially fried product into hot quart glass jar or enameled tin can. A quart jar will hold two to four small chickens. Pour liquid from the griddle or frying pan into the container over the chicken. Place rubbers and caps of jars into position, not tight. Cap and tip tin cans. Sterilize for the length of time given below for the particular type of outfit used:

	Minutes.
Water bath, homemade or commercial.....	90
Water seal, 214°	60
5 pounds steam pressure.....	40
10 to 15 pounds steam pressure.....	30

In a similar way any fowl or wild game may be prepared by frying, oven-baking, roasting, or stewing. The meat products which may be canned in this way include beef, pork, Hamburg steak, sausage, venison, rabbit, squirrel, raccoon, opossum, lamb, and all types of sea food. All may be packed after cooking three-fourths done in any desired way. Hot glass jars or enameled tin cans may be used. When the products are packed while hot in the containers the hot liquids, gravies, dressings, etc., or hot water should be poured over them. Put rubbers and caps of jars into position, not tight. Cap and tip tin cans. Sterilize for the length of time given below for the particular type of outfit used:

	Minutes.
Water bath, homemade or commercial.....	90
Water seal, 214°	60
5 pounds steam pressure.....	40
10 to 15 pounds steam pressure.....	30

Tighten jars and invert to test joints.

CAMP RATIONS.

Ration No. 1.—Products required for mixture:

4 pounds rice.	1 pound cheese (or $\frac{1}{2}$ pound butter).
1 pound fresh green peppers.	1 pound fresh pork.
4 Chili peppers.	4 Spanish peppers.
4 cloves or 2 garlic.	8 level teaspoonfuls salt.
4 quarts tomatoes.	4 quarts water.

Put the meat, peppers, and garlic through a food chopper. Mix with tomatoes, water, and salt. Cook on slow fire, simmering for 45 minutes. Soak rice in salted water for 20 minutes. Rinse with cold water at once. Mix this product with the sauce without straining. Grind or grate cheese and mix thoroughly with all the other products.

To can this ration, the mixture should be packed in hot glass jars or tin cans while hot. Place rubbers and caps of jars in position, not tight. Cap and seal tin cans completely. Sterilize for the length of time given below for the particular type of outfit used:

	Minutes.
Water bath, homemade or commercial.....	90
Water seal, 214°	60
5 pounds steam pressure.....	50
10 pounds steam pressure.....	40

Remove jars or cans; tighten glass jar covers; invert to cool, and test joints. Wrap jars to prevent bleaching, and store.

Ration No. 2.—Products required for mixture:

1 pound rice or hominy, cracked.	2 quarts water or milk (or 1 quart water and 1 quart milk).
1 teaspoonful salt.	
$\frac{1}{2}$ pound bacon or chipped beef cut into small pieces.	$\frac{1}{2}$ pound sweet green peppers cut fine.
1 pound mixed equal parts carrots, onions, beans, Irish potatoes.	1 pint strained tomatoes.
	Season with celery salt or celery seed.

Cook rice or hominy, water or milk, and salt in a double boiler until the rice or hominy is soft. Bacon or chipped beef, green peppers, and the strained tomatoes should be cooked or boiled separately. Then add to this mixture the 1-pound mixture of vegetables and season with mixed spices. Cook this vegetable combination until done. Mix at once rice, bacon, green peppers, etc. Stir this well into the mixture.

The product to be canned should be hot and thoroughly mixed. Pack mixture into hot glass jars or tin cans at once to one-eighth inch of top. Place rubbers and caps of jars in position, not tight. Seal tin cans completely. Sterilize for the length of time given below for the particular type of outfit used:

	Minutes.
Water bath, homemade or commercial.....	90
Water seal, 214°.....	60
5 pounds steam pressure.....	50
10 pounds steam pressure.....	30

Remove jars; tighten covers; invert to cool, and test joints. Wrap and store.

Ration No. 3.—One-pound pack. Products used:

8 ounces beef.	1 ounce carrots.
2 ounces potatoes.	1 ounce beans.
2 ounces onions.	2 ounces beef gravy.

Parboil the beef in kettle with thin gravy for 30 minutes. Cut up potatoes, onions, and carrots into small sections; add the beans. Place entire mixture into kettle; add the gravy, season to taste. Stir mixture and cook for 10 minutes.

To can the mixture, pack it hot into hot glass jars or tin cans to one-eighth inch of top. Place rubbers and tops of jars in position, not tight. If using tin cans, seal completely. Sterilize for length of time given below for the particular type of outfit used:

	Minutes.
Water bath, homemade or commercial.....	90
Water seal, 214°.....	60
5 pounds steam pressure.....	50
10 pounds steam pressure.....	40

Remove jars or cans; tighten jar covers; invert to cool, and test joints. Wrap and store.

TIME-TABLE FOR SCALDING, BLANCHING, AND STERILIZING VEGETABLES, SOUPS, FRUITS, AND MEATS.

Products by groups.	Scald or blanch.	Hot- water- bath outfits, at 212°.	Water- seal outfits, 214°.	Steam pressure 5 to 10 pounds.	Pressure cooker, 10 to 15 pounds.
SPECIAL VEGETABLES.					
Tomatoes.....	1½	22	18	15	10
Pumpkin.....	3	120	90	60	40
Squash.....	3	120	90	60	40
Hominy.....	3	120	90	60	40
Sauerkraut.....	3	120	90	60	40
Corn, sweet.....	5	180	120	90	60
Corn, field.....	10	180	120	60	50
Mushrooms.....	5	90	80	50	30
Sweet peppers.....	5	90	75	60	40
POD VEGETABLES AND OTHER GREEN PRODUCTS.					
Beans, wax.....	5-10	120	90	60	40
Beans, stringless.....	5-10	120	90	60	40
Okra.....	5-10	120	90	60	40
Peppers, green or ripe.....	5-10	120	90	60	40
Cabbage.....	5-10	120	90	60	40
Brussels sprouts.....	5-10	120	90	60	40
Cauliflower.....	3	60	40	30	20
ROOT AND TUBER VEGETABLES.					
Carrots.....	5	90	80	60	40
Parsnips.....	5	90	80	60	40
Salsify.....	5	90	80	60	40
Beets.....	5	90	80	60	40
Turnips.....	5	90	80	60	40
Sweet potatoes.....	5	90	80	60	40
Other roots and tubers.....	5	90	80	60	40

Time-table for scalding, blanching, and sterilizing vegetables, soups, fruits, and meats—Con.

Products by groups.	Scald or blanch.	Hot- water- bath outfits, at 212°.	Water- seal outfits, 214°.	Steam pressure 5 to 10 pounds.	Pressure cool. r. 10 to 15 pounds.
COMBINATIONS AND SOUP VEGETABLES.					
Lima beans.....	5-10	180	120	60	40
Peas.....	5-10	180	120	60	40
Vegetable combinations.....	5-10	120	120	60	45
GREENS, DOMESTIC OR WILD.					
Swiss chard.....	15	120	90	60	40
Kale.....	15	120	90	60	40
Chinese cabbage leaves.....	15	120	90	60	40
Up and cress.....	15	120	90	60	40
French endive.....	15	120	90	60	40
Cabbage sprouts.....	15	120	90	60	40
Turnip tops (young, tender).....	15	120	90	60	40
Spinach, New Zealand.....	15	120	90	60	40
Spinach.....	15	120	90	60	40
Beet tops.....	15	120	90	60	40
Dandelion, cultivated.....	15	120	90	60	40
Dandelion, wild.....	15	120	90	60	40
Dandelion sprouts (tender).....	15	120	90	60	40
Mustard, native.....	15	170	90	60	40
Mustard, Russian.....	15	120	90	60	40
Mustard, wild.....	15	120	90	60	40
Collards.....	15	120	90	60	40
Rape (tender leaves).....	15	120	90	60	40
Pepper cress.....	15	120	90	60	40
Lamb's quarter.....	15	120	90	60	40
Sour dock.....	15	120	90	60	40
Smart weed.....	15	120	90	60	40
Sprouts.....	15	120	90	60	40
Purslane, or "pusley".....	15	120	90	60	40
Pokeweed sprouts.....	15	120	90	60	40
Marsh marigold.....	15	120	90	60	40
Milkweed (tender sprouts and young leaves).....	15	120	90	60	40
SOFT FRUITS AND BERRIES.					
Apricots.....	1-2	16	12	10	5
Blackberries.....	16	12	10	5	5
Blueberries.....	16	12	10	5	5
Cherries.....	16	12	10	5	5
Currents.....	16	12	10	5	5
Dewberries.....	16	12	10	5	5
Figs.....	1-2	16	12	10	5
Gooseberries.....	1-2	16	12	10	5
Grapes.....	16	12	10	5	5
Huckleberries.....	16	12	10	5	5
Peaches.....	1-2	16	12	10	5
Plums.....	16	12	10	5	5
Raspberries.....	16	12	10	5	5
Strawberries.....	16	12	10	5	5
Citrus fruits.....	1-2	12	8	6	4
Fruits without sugar sirup.....	30	20	12	10	10
HARD FRUITS.					
Apples.....	1½	20	12	8	6
Pears.....	1½	20	12	8	6
Quinces.....	1½	20	12	8	6
Windfall apples (pie filling).....	12	10	8	5	5
Quartered apples (sard).....	12	10	8	5	5
Whole apples, pared and cored.....	16	10	8	5	5
Apple sirup.....	15	10	8	5	5
Fruit juices.....	15	10	8	5	5
Preserves, after preparation and filling.....	20	15	10	.....	.....
MEATS.					
<i>Uncooked.</i>					
Poultry and game.....		180	180	120	60
Beef.....		180	180	120	60
Corn beef.....		180	180	120	60
<i>Prepared young meats.</i>					
Spring fries.....		90	60	40	30
Fried meats.....		90	60	40	30
Baked meats.....		90	60	40	30
Stewed meats.....		90	60	40	30
Roast meats.....		90	60	40	30

Time-table for scalding, blanching, and sterilizing vegetables, soups, fruits, and meats—Con.

Products by groups.	Scald or blanch.	Hot- water- bath outfits, at 212°.	Water- seal outfits, 214°.	Steam pressure 5 to 10 pounds.	Pressure cooker, 10 to 15 pounds.
MEATS—continued.					
<i>Prepared mature meats.</i>					
Wild game.....		90	60	40	30
Fowls.....		90	60	40	30
Cockerels.....		90	60	40	30
Fried meats.....		90	60	40	30
Baked meats.....		90	60	40	30
Stewed meats.....		90	60	40	30
Roast meats.....		90	60	40	30
Fish.....	5	180	160	120	90
Shellfish.....	5	180	160	120	90
CAMP RATIONS.					
No. 1.....		90	60	50	40
No. 2.....		90	60	50	30
No. 3.....		90	60	50	40
SOUPS.					
Cream of tomato soup.....		30	20	18	10
All other soup combinations and soup stock.....		90	75	60	45

All vegetables, meats, and other food products used in the soup combinations should be prepared and treated prior to sterilization in the same way as when canned separately, and then mixed, packed, and thoroughly sterilized.

This time schedule is based upon the one-quart pack and upon fresh products at altitudes up to 1,000 feet. For higher altitudes increase the time 10 per cent for each additional 500 feet.

When processing fruits in steam-pressure canners, not over 5 pounds of steam pressure should be used.

When processing vegetables, do not use over 15 pounds of pressure.

SPECIAL CANNING PRECAUTIONS AND SUGGESTIONS.

MOLD ON CANNED GOODS.

Mold may develop on canned goods if the seal is defective, if after sterilizing the tops are removed from the jars to replace the rubber rings, and if the jars are kept in a damp place where the rubbers may decompose.

SHRINKAGE DURING STERILIZATION.

Shrinkage may occur during sterilization because of improper and insufficient blanching and cold-dipping, careless packing, poor grading, sterilizing for too long a period, or lack of judgment in the amount and size of product put into the container.

BLANCHING GREENS.

The proper way to blanch all greens or potherbs is in a steamer or in a vessel improvised to do the blanching in steam above the water line. If this is done, a high percentage of mineral salts and volatile oil is retained in the product.

SPECIAL REQUIREMENTS OF CORN, PEAS, BEANS, AND ASPARAGUS.

Canned corn, peas, beans, and asparagus may show no signs of spoilage and still when opened have a sour taste and a disagreeable

odor. This specific trouble is known to the canner as "flat-sour," and can be avoided if the canner will use fresh product, that is, one which has not been gathered more than five or six hours, and will blanch, cold-dip, and pack one jar of the product at a time, and place each jar in the canner as it is packed. The first jar in will not be affected by the extra cooking. When the steam-pressure canner is used the jars or cans may be placed in the retort, the cover placed in position, but not clamped down until the retort is filled. Rapid cooling of these products prevents overcooking, clarifies the liquid, and preserves the shape and texture.

HANDLING AND SEALING CONTAINERS.

GLASS JARS.

Glass jars of several types are available for use in home canning. The types in most general use, however, are those with metal screw tops, those with glass and spring tops, and those with suction seal tops. While large-necked bottles and jars not provided with sealing tops can not be used for canning, they can be used as containers for preserves, marmalades, jellies, and other fruit preparations in which heavy or thick sirups are used. Such jars can be capped with paper and paraffin, or, in the case of jellies and stiff marmalades, with paraffin alone.

Before food to be canned is prepared for packing, jars should be tested, washed, and placed in a vessel of cool water on a stove to heat. The jars should be kept hot in the water until needed for packing. To test screw-top jars, place the top on the jar without a rubber and screw down tight. If a case knife can be inserted easily between the top and the glass, the top usually is defective. Another test is to screw the top down lightly on a rubber and pull the rubber from its position. If, when released, the rubber ring returns to its position between the top and the jar, the top is defective.

If a glass top, placed on a jar without a rubber, rocks when pressed, it is defective. The wire bails which hold glass tops in place should go on with a snap even when the tightening lever on the clamp spring is up. If the bail is not tight, it should be removed from the tightening lever and bent until it fits tightly. This tightening of the bail should be done every year.

Only good, elastic rubber rings should be used. Practically this means new rubbers, as rubbers seldom will stand use a second time. The product to be canned should be placed in jars while the jars are hot. Rubbers and tops should then be put in place, but the sealing levers should not be tightened until after processing.

Glass jars, of course, must be handled carefully to prevent breakage. Hot jars should not be brought into contact with cold metal, stone, or water, or placed in a draft of cold air. Cold jars should not be placed in hot water, nor have hot liquids poured into them. The

wire bails of glass-top jars should not be so tight that the tops will be crushed when the levers are pressed down in sealing.

CROCKERY JARS.

Several types of crockery jars which have rubber top and clamp-spring adjustment for sealing hermetically may be purchased. These jars, in sizes ranging from 1 pint to 1 gallon, may be used successfully in connection with the one-period cold-pack method of canning. They should be handled in the same manner as are the clamp-spring glass-top jars. Crockery jars should be washed with special care since they do not show the presence of dirt as do glass jars. They should be heated thoroughly before they are filled with food products.

For all packs in crockery jars of more than 1-quart size the time for sterilization should be increased 10 to 20 per cent over the sterilization period scheduled for glass jars of the same size.

This is necessary because the crockery jars will not transmit heat as rapidly as the thin glass jars or tin cans. On the other hand, they do not cool as rapidly as do the glass jars, thus giving the product a little longer period under high temperature. It is also possible when using crockery jars to plunge them into cold water a short while (but not immediately) after removal from the sterilizer in order to effect the rapid cooling of the product. When this rapid-cooling system is used it will not be necessary to increase the time required for cooking.

TIN CANS.

Most products may be packed in plain tin cans. A few products, however, should be packed in enameled cans in which the enamel prevents the products from acting chemically on the tin coating of the container. Enameled cans should be used for greens, beets, strawberries, cherries, pumpkin, squash, fish, poultry, and meat.

Tin cans are practicable for the home canning of fruits, vegetables, greens, soups, and meats, and their use is considered by many persons to simplify the operation and make possible the accomplishment of more work in a given time. Products packed in tin cans are handled easily in transportation and storage.

SIZES OF TIN CANS.

Several standard sizes of tin cans are in common use for home canning purposes and may be had in either sanitary or cap-and-hole type:



FIG. 18.—Three sizes and types of hermetically sealed crockery jars. May be used successfully in home canning of food products.

Number, size, and diameter of openings of tin cans.

No. of can.	Size of can (inches).	Diameter of opening (inches).
1.....	2 $\frac{5}{8}$ by 4..	2 $\frac{1}{8}$
2.....	2 $\frac{3}{8}$ by 4 $\frac{1}{8}$.	2 $\frac{1}{8}$ or 2 $\frac{1}{4}$
3.....	2 $\frac{1}{8}$ by 4 $\frac{1}{8}$.	2 $\frac{1}{8}$ or 2 $\frac{1}{4}$
10.....	6 $\frac{1}{8}$ by 6 $\frac{7}{8}$.	2 $\frac{1}{8}$ or 2 $\frac{1}{4}$

TYPES OF TIN CANS.

There are two general types of cans on the market that are used as containers for food.

The sanitary or rim-seal can consists of can and cover pressed into a definite shape. That part of the cover that comes in contact with the can is coated with a compound or fitted with a rubber film, paper gasket or ring that makes a perfect seal when the cover is crimped on the can. The seal can be made only with a machine constructed for the purpose. No heat or solder is required to make the seal.

Special rim-seal cans.—Several types of rim-seal cans differ from the ordinary sanitary can in construction. They are made for use in special machines.

Cap-and-hole tin cans.—The cap-and-hole can consists of a can and cover. The cover carries a rim of solder, as shown on the lower left-hand corner of figure 20. The cap is fastened on the can by the application of heat, as described later.

USE OF MECHANICAL SEALERS FOR SANITARY OR RIM-SEAL CANS.

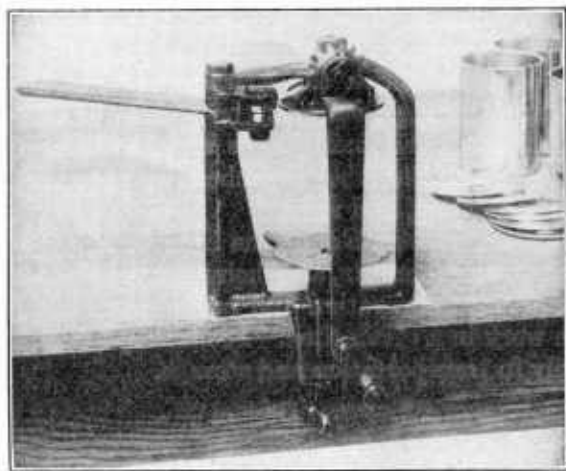


FIG. 18.—Small hand sealer for No. 2 cans.

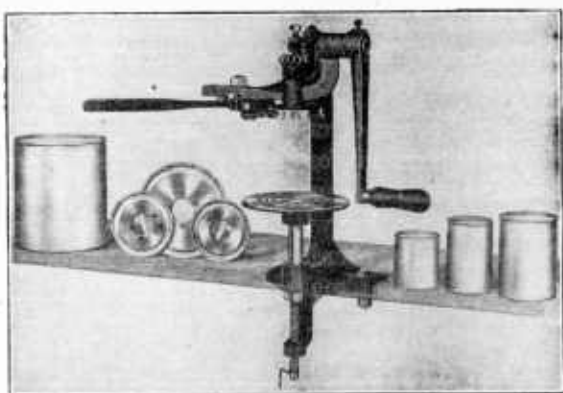


FIG. 17.—Mechanical sealing machine used for three sizes of cans.

In canning in tin cans to be sealed with mechanical sealers (figs. 18 and 19) the recipe is followed as for glass jars and the boiling water or sirup poured over the product. The can should be sealed immediately after the boiling liquid is added. Two distinct operations are required to seal either the sanitary or the rim-seal

can. When the can is placed in the machine and clamped into position the first roll is applied while the can is revolved. This operation should be continued until the cover is locked into position on the can and the lap joint made. The second roll is then applied and the can revolved to close the joint and thus hermetically seal the can. These mechanical sealers are adjustable to handle No. 2, No. 2½, No. 3, and No. 10 sanitary cans. Complete instructions are furnished with the machines.

TESTING JOINT OR SEAL.

To determine if the machine is adjusted properly, place three or four tablespoonfuls of water in a can and seal. Hold the sealed can under the surface of hot water for three minutes. If air bubbles rise from the can it indicates that the seal has not been made properly. Special rim-seal cans should be handled according to instructions of the manufacturer.

SEALING CANS.

When tin cans are used as containers they are sealed by soldering, or, if of the "sanitary" type, by mechanical sealing machines, as described above. Cans must be sealed before they are processed.

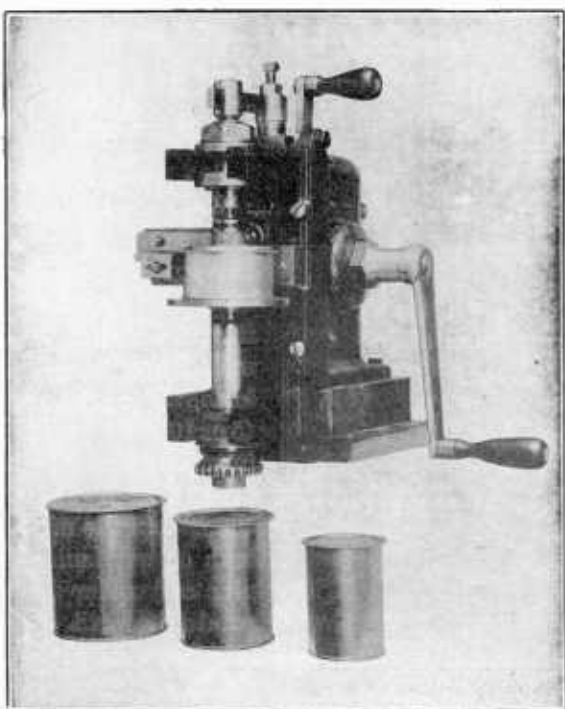


FIG. 19.—A special mechanical sealing machine.

If solder is used, the equipment required includes a capping iron, a tipping copper, soldering flux, a small brush, a porcelain, glass, or stoneware cup in which to keep the soldering flux, sal-ammoniac, a few scraps of zinc, solder, a soft brick for polishing irons, and a file. If a hand sealing machine and solderless cans are used, all other equipment and material are unnecessary.

Soldering flux.—Soldering flux is a solution of zinc in crude muriatic acid. It is used for cleaning the irons and for brushing

the tin and solder surfaces, so that the solder will adhere to the tin. It may be made as follows: Place 2 or 3 ounces of muriatic acid (purchased at a drug store) in a porcelain, stoneware, or glass jar and add as much sheet zinc in small pieces as the acid will dissolve; when the zinc has dissolved dilute the solution to

twice its quantity with water and strain through a piece of cloth. Flux is always best when it has stood at least 12 to 16 hours before being used. Keep the flux well mixed and free from dust and dirt. Care should be taken not to spill the flux on clothing.

Soldering flux ready for use may be purchased at some drug stores and hardware stores. Sometimes powdered rosin is used as a substitute for the flux. Recently a soldering paste has been manufactured which is desirable for use in canning work, because it is convenient and clean to handle.

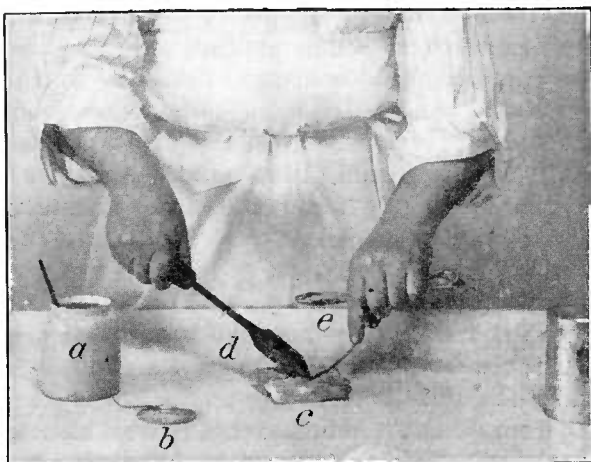


FIG. 20.—Tinning the tipping copper (or soldering iron): *a*, Flux jar and brush; *b*, solder-hemmed cap; *c*, bar sal ammoniac; *d*, tipping copper or soldering iron; *e*, wire solder.

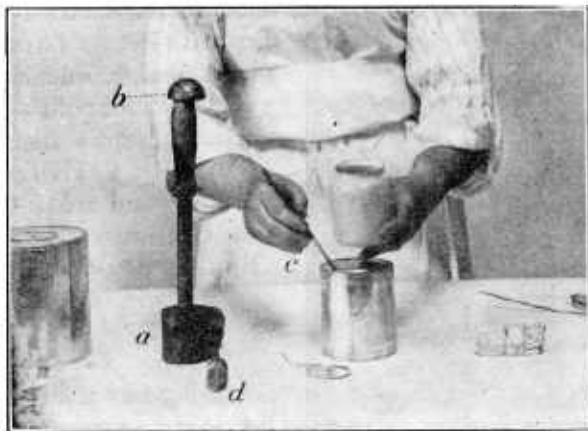


FIG. 21.—Applying the flux, the first step in soldering tin cans: *a*, Capping iron; *b*, head of inner upright steel; *c*, proper position of brush while stroking rim of cap with flux; *d*, tipping copper or soldering iron.

Tinning the capping iron.—Clean the iron with a file, brick, or knife; heat it sufficiently to melt a little solder in the sal ammoniac (5 or 10 cents' worth purchased at a drug store); then place the iron in the mixture of sal ammoniac and solder and rotate it until the soldering edge of the iron is thoroughly covered with the solder.



FIG. 22.—Position of capping iron and upright steel before lowering and sealing the rim.

while the capping and tipping irons are in the fire heating. Take a handful of solder-hemmed caps and place the caps on all cans ready to be capped. Place a finger on the vent-hole, hold the cap in place, and run the brush containing a small amount of flux around the solder-hemmed cap, evenly, with one stroke of the hand. Be careful not to get the flux inside of the can. Do this with all cans ready to be capped. (See fig. 21.) Then take the capping iron from the fire and insert the upright steel in the center. Hold the capping iron above the cap until the center rod touches the cap and holds it in place. (See fig. 22.) Then bring the cap down in contact with all four points of the solder-hemmed cap and rotate back and forth about three strokes (fig. 23). Do not bear down on the capping iron. A forward and backward rotation,

Tinning the tipping copper.—The tipping copper is tinned in much the same way as the capping iron (fig. 20). Sometimes it is desirable, however, to file the tipping copper sufficiently to make it smooth and to correct the point. The copper should be filed to nearly a sharp point. All particles of smudge, burned materials, etc., should be removed from the iron before tinning. Heat the copper and rotate the tip of it in the mixture of sal ammoniac and solder until it has been covered with the melted solder and is as bright as silver.

When capping the full cans, arrange them in rows upon the table

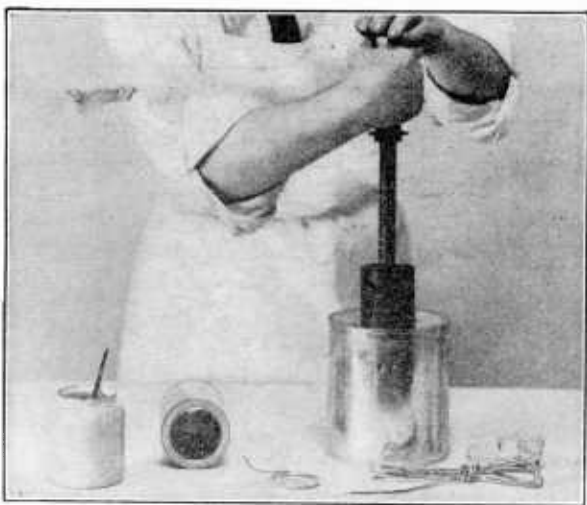


FIG. 23.—Method of holding iron and position of hands for rotating the capping iron to strike all points of cap at same time.

if properly applied, will solder the cap in place perfectly. Remove the capping iron and inspect the joint. (See fig. 23.) If any pinholes are found, recap or repair with the tipping copper. It may be necessary to use a piece of wire solder or a waste solder rim from a cap to add more solder to the broken places or pinholes of a cap (fig. 24).

Tipping a tin can.—With the flux jar and brush conveniently at hand, dip the brush in the flux and strike the venthole a side stroke lightly with the brush saturated with flux. Place the point of the wire solder over the venthole. Place upon this the point of the hot, bright, tipping copper. Press down with a rotary motion and remove quickly. (If a waste solder-hemmed cap rim is available, this may be used instead of the wire solder.)

With a little practice a smooth, perfect joint is easily made.

SUGGESTIONS ON ORDERING TIN CANS.

In buying hole-and-eap cans it always is necessary to state whether you desire plain tin or enameled (lacquered) cans. In buying eaps always ask for solder-hemmed caps and give the diameter of the can opening. For whole fruits and vegetables, cans with $2\frac{7}{16}$ -inch or even larger openings are preferable. Since the size of the can opening varies, and ordinarily it will not be advisable to have more than one capping iron, it is recommended that the larger size ($2\frac{7}{16}$ -inch) capping iron be purchased.



FIG. 24.—A self-heating capping iron.

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